

A DISTINCTIVE NEW CALOCHORTUS (LILIACEAE) FROM  
MARIN COUNTY, CALIFORNIA

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While it is not unusual for a new species of plants to be described from a state as well collected as California, it is remarkable that a plant as distinctive as the species of *Calochortus* described herein has escaped discovery for so long, since it is from an area that has been given considerable attention (Howell 1970, Peñalosa 1963). In overall appearance it is easily recognized and in detail it shows a combination of characteristics unique in the genus. It is in fact so distinctive that its existence challenges the currently accepted infrageneric classification.

***Calochortus tiburonensis*** A. J. Hill, sp. nov.

Bulbi tunica, saltem apud bulbos maiores, fibroso-reticulata; folium basale unicum, planum, usque ad post anthesin tempum viride: flores late campanulati, erecti; petala pallida flavo-viridia, fimbriata, maculis

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guttisque badiis ornata, maxima parte centrali deltoideo-ovata, apice acuta vel acuminata, late unguiculata, glandula infra medium posita, superficie nuda, pilis gracilibus proxime supra atque utroque et lateraliter fere usque ad apicem barbata, profunde lunata, versus petali apicem arcuata, depressa, margine inferiori membrano lato, ea superiori seriebus duabus vel pluribus processibus applanatis instructa; ovarium lineare, non alatum; fructus fusiformi-prismaticus, in transectione triangularis, erectus; semina parum compressa, asymmetrica vel plus minusve rhomboideo-prismatica, atropurpurea, testa sexangulariter reticulata.

Bulb ovoid, with coat membranous or fibrous-reticulate in larger bulbs; stems slender, to 5 dm or more in height, usually branched, not bulbiferous; basal leaf single, linear-oblong, to 17 mm or more in width and to 6 dm or more in length, usually green at anthesis; cauline leaves linear, involute, reduced upward; inflorescences bracteate, the bracts similar to the cauline leaves, the flowers usually in pairs or less frequently three from the ultimate axils; flowers broadly campanulate in outline, erect, the petals light yellow-green, flecked to varying degrees with purplish-brown and with more or less conspicuous transverse arching bands of the same color, the most prominent of which is near the mid-point; sepals about equalling or slightly longer than the petals, lance-oblong, attenuate, glabrous, pale yellow green, flecked, streaked, and veined with purplish-brown; petal blade deltoid-ovate, rounded laterally, acute to acuminate above and very broadly clawed below, with a conspicuous complex glandular area below the middle; basal portion of petal, including the glandular region, extending outward more or less at a right angle from the vertical axis of the flower, the apical portion curving abruptly upward to an erect position; petals long-fimbriate from above the claw to near the tip with long, slender hairs similar to the lateral fimbriations; gland deeply crescent-shaped, about one-half the width of the petal, depressed, the surface naked, bordered below with a broad, erect, upward arching, erose and minutely papillose membrane, bordered above with two or more indistinct rows of transversely flattened processes, which are often engaged and sometimes divided apically, the processes similar in appearance to the lower membrane, but less broad with respect to the vertical dimension of the lower membrane; stamens about equal to or slightly shorter than the petals, the filaments parallel to the flower axis to near tip, then divergent; anthers slightly longer than the filaments prior to shedding of pollen, narrowly lanceolate, short acuminate, divergent from the flower axis; ovary linear, not winged, tapering to a persistent trifold stigma; stigma-branches linear, strongly divergent and curved; fruit fusiform-linear, acute, triangular in cross-section, several times the length of the pistil at anthesis, erect; seeds in two closely appressed rows in each locule, slightly compressed, irregular or roughly rhomboid-prismatic in shape, dark purplish, with a hexagonally reticulate coat. Figure 1.

TYPE. *A. J. Hill 51239.4A*, north slopes of Ring Mt., Tiburon Peninsula, Marin Co, California, elevation ca 110 m, June 19, 1972 (UC 1393720—holotype; isotypes to be distributed to US, UCLA, and RSA).

Known only from the vicinity of the type locality in an area about 0.8 kilometers across. It is found on rocky slopes of serpentine and serpentine derived soils. The area is open, with a variety of grasses and other annual and perennial herbs. There are limited areas of shrubs and wind-swept trees, but no plants of this *Calochortus* were seen growing in these areas. The site of the type locality is privately owned and there is considerable interest in including it in an adjacent open space area slated to be purchased by the city of Tiburon.

In its combination of morphological features *Calochortus tiburonensis* is unlike any other species of the genus. It does not fall within any of the three sections of the genus as delimited in the most recent monographic treatment (Ownbey 1940), but shows features that are normally found in two of these sections. The flat, usually single, rather persistent basal leaf would place it among the species of sections *Calochortus* (= *Eucalochortus*) or *Cyclobothra* and make it rather distinct from those of section *Mariposa*.

The fibrous-reticulate bulb coat, although not as reticulate as in many species of the section, and non-winged capsule could be considered sufficient evidence to place *Calochortus tiburonensis* in section *Cyclobothra*. The general coloration and shape of the flower, the petal margin and vestiture, and the habit of the plant also give the general appearance of some species of this section, such as *C. weedi*. However, the glandular area of the petal, which is prominently developed in the genus and appears to be of considerable diagnostic value, is definitely unlike that found in the species of section *Cyclobothra*. Moreover, it is quite similar to a type of gland found in species of section *Calochortus*, such as *C. tolmei*. The darkly pigmented, reticulate seed coat and only slightly compressed seeds are also typical of species of section *Calochortus*, although this type of seed may also be found among species of section *Cyclobothra*, the seeds of many of which have not yet been described.

Geographically, *Calochortus tiburonensis* also seems to occupy an intermediate position between the two sections. The nearest representative of section *Cyclobothra* is found 250 kilometers to the south of the Tiburon area, with the remaining species further to the south in California and in Mexico and Guatemala. The greatest species diversity in section *Calochortus* is in the Pacific Northwest with the number of species decreasing sharply south of the San Francisco Bay area. *Calochortus tiburonensis* occupies a position distinctly to the south of the center of diversity of section *Calochortus*.

The highly unusual combination of characteristics, geographic position, and localized occurrence of *C. tiburonensis* suggest the possibility, although remote, that it may be the result of hybridization. However,

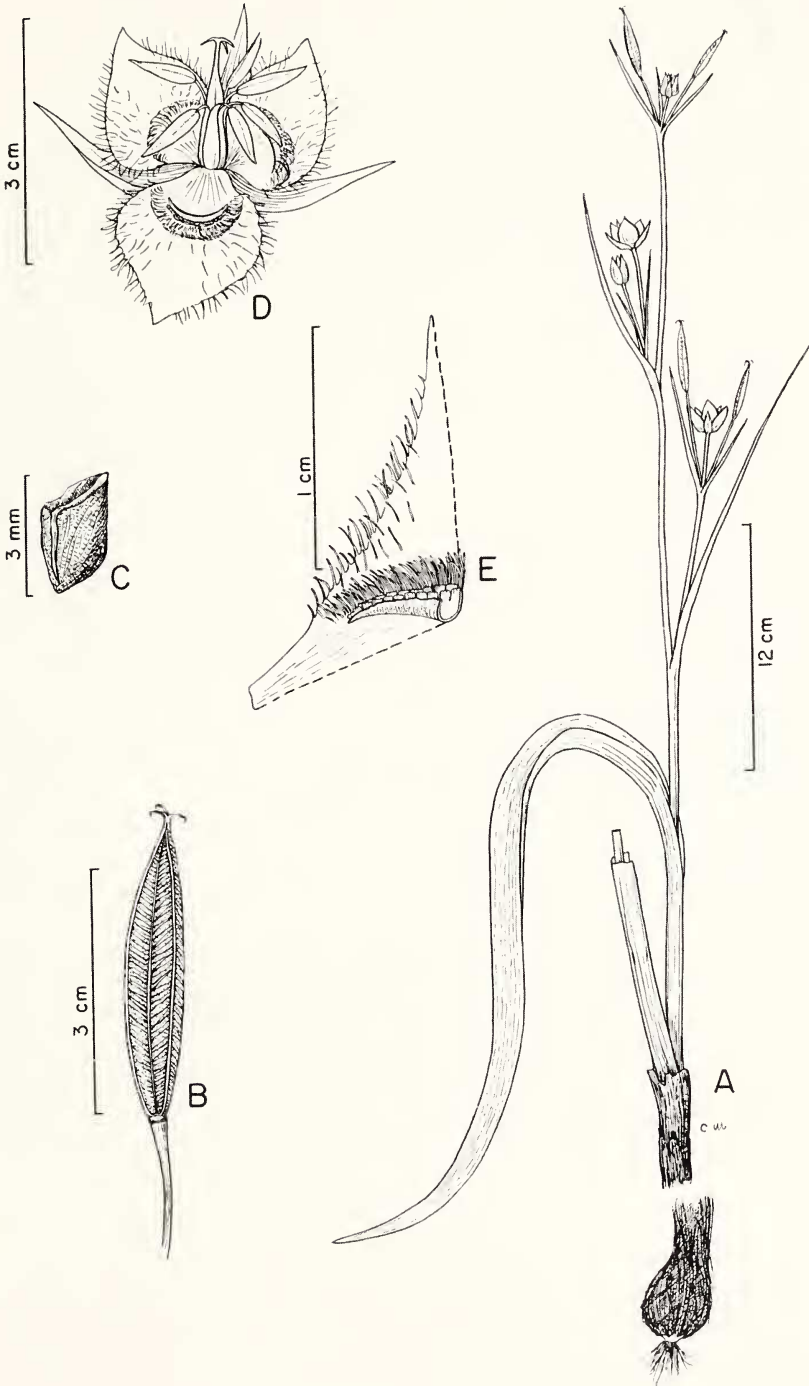
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FIG. 1. *Calochortus tiburonensis*: A, habit with portion of persistent previous year's stem and leaf shown on the left; B, mature fruit; C, seed; D, flower with forward petal bent down and forward for clarity; E, side view of one-half of petal in longitudinal section. (From collection A. J. Hill 51239.4)

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aside from variations in the depth of the purplish pigmentation in the flowers and general size of the plants, the population appeared to be quite uniform on field examination and without any variations that would suggest hybridization. Examination of a scattered sample of immature capsules in the field did not reveal any with reduced seed set. Pollen fertility, as judged under the microscope when stained with cotton blue in lactophenol, was 96, 98, and 99 per cent in samples of 600 grains from a single flower each of three plants, which compares favorably with observations on other *Calochortus* species. In these preliminary studies, then, there is nothing to support the idea of hybridization, at least of recent occurrence.

The occurrence of this intermediate species does establish a closer relationship between the two sections than was previously recognized and challenges the concept of placing the two species groups in separate sections on a par with the third species group in the genus. It also challenges the idea of Hoover (1944) that they should possibly be placed in separate genera.

The existence of an unidentifiable *Calochortus* was apparently first noticed by Dr. Robert West and was subsequently seen by Mrs. J. C. Youngberg, Miss Annetta Carter, and Mrs. George Ellman. Miss Carter reported the occurrence of the *Calochortus* to the author. The credit for the actual discovery belongs to these persons whose interest in protecting the open space of Marin County was probably the most significant factor in their making the discovery.

That a previously uncollected new species, and one of potentially great significance in interpreting relationships within the genus, was discovered in such a botanically well known area suggests the need for a very careful look at any areas that are threatened by development or other disturbance, especially near expanding population centers. Had this species not been noticed soon, it might very well have become extinct without ever having been recorded.

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